

Topic: Energy Transfer

Issues tackled:

1. Models and analogies - Particle models to explain conduction and convection.
2. ICT - The relationship between input, useful output and wasted output.

Issue 1: Models and analogies - Particle models to explain conduction and convection

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Research ideas for using a particle model to explain conduction of heat in metals and other solids, or convection in fluids.
2. Make an atomic model of a metallic solid, and be prepared to discuss the role of free electrons during conduction.
3. Make a particle model of a fluid, and be prepared to discuss the role of density in convection.

Possible activities during tutorial:

- 1, 2 and 3. Present the ideas/models they have researched and developed and discuss how they could be used in the classroom.

AST Input:

- Lead a discussion on the part played by electrons in the transfer of heat energy by conduction and get trainees to think about how to get this concept across to pupils, or
- Lead a discussion on the part played by density in the transfer of heat energy by convection.

Reading: Subject knowledge and understanding

Johnson, K. and Ryan, L. (2004) **Physics for You**, Nelson Thornes, Cheltenham.

OCR GCSE Science Revision Guide

Milner, B., (2001), **Science Foundations: Physics**, Cambridge University Press, Cambridge

Subject pedagogy

Useful websites and applications

CD ROM Multimedia Science School see www.platolearning.co.uk

CD ROM Crocodile Physics see www.crocodile-clips.com

Resources: Tutorial

Any particle models available to help explain heat transfer.

Issue 2: ICT - The relationship between input, useful output and wasted output

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Find out about the use of chart wizard in excel, to display related information in the form of a bar chart, to represent energy transfer in different types of electric lamp. Diagrams need to show the relationship between input, useful output(s) and wasted output(s).
2. Look at ways of representing efficiency using Sankey diagrams. Research software or web based applications which give examples of them.

Possible activities during tutorial:

1. Present the spreadsheet activity developed, to compare the efficiency of low energy lamps with filament lamps.
2. Present Sankey Diagrams for different lamps and other machines, using appropriate software.

AST Input:

- Discuss improvements in design of lamps in order for greater efficiency.
- Discuss how excel could be used to support teaching of useful / wasted energy. How could efficiency be tackled using the spreadsheet?

Reading: Subject knowledge and understanding

Johnson, K and Ryan, L. (2004) **Physics for you**, Nelson Thornes, Cheltenham.

Subject pedagogy

Useful websites and applications

www.bbc.co.uk/bitesize has basic information about efficiency and Sankey diagrams.

<http://www.doka.ch/sankey1.htm> offers a free macro to use with excel to produce Sankey diagrams.

Resources: **Task 1**

Computer running excel spreadsheet software.

Task 2

Computer and access to the internet.

Tutorial

Data on the efficiency of different light bulbs and other simple machines.

Computer.